



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/802,693	03/08/2001	Takashi Hiroi	16869P017810	8024

20350 7590 10/29/2004

TOWNSEND AND TOWNSEND AND CREW, LLP
TWO EMBARCADERO CENTER
EIGHTH FLOOR
SAN FRANCISCO, CA 94111-3834

EXAMINER

WERNER, BRIAN P

ART UNIT

PAPER NUMBER

2621

DATE MAILED: 10/29/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/802,693

Applicant(s)

HIROI ET AL.

Examiner

Brian P. Werner

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-55, 66-69 and 83-87 is/are pending in the application.
- 4a) Of the above claim(s) 37, 38, 47, 50, 54, 55 and 66-69 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-36, 39-46, 48, 49, 51-53 and 83-87 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 2, 2004 has been entered. The status of the claims is as follows:

Pending: 34-55, 66-69 and 83-87.

Withdrawn: 37, 38, 47, 50, 54, 55, 66, 67, 68 and 69.

Claim Examined Herein: 34-36, 39-46, 48, 49, 51-53 and 83-87.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(c) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2621

3. Claim 34, 35, 83 and 84 are rejected under 35 U.S.C. 102(b) as being anticipated by Lam (US 5,043,663 A).

Regarding claim 34, Lam discloses:

displaying a first standard on a display (Lam initially inputs “any and all defects” at column 4, line 32, and then applies an initial “threshold number selected by the user” at column 5, line 20; the threshold is displayed along with a depiction of the defect data as seen in figure 4a; see “threshold value for the display” at column 7, line 54), the first standard used to (NOTE: The following phrase is an “intended use” statement, and not a positively recited method step. However, the limitations are nevertheless met by the Lam reference) select defect candidate indications to be shown on a candidate distribution screen (e.g., figure 4A, numerals 50 are candidate defect indications that exceed the threshold; they are candidate defects because some will be filter out as “false ... indications” at column 7, line 61) and to store in a memory (the defect signals are stored in a memory; see “record the remainder for further processing” at column 5, line 25; “store information contained in defect signal 24” at column 9, line 56; when the user sets are changes a threshold as described at column 13, lines 30-39, then the system “operates to retrieve the defect data from storage and display the data” at column 9, lines 64-65);

graphically displaying a relation between defect density and threshold in which the first standard is indicated (figure 4A, numeral 52; all of the defects, or peaks in the defect signal are depicted over the length of segment inspection; thus, given that all of the defects for a particular length of inspected segment are depicted, defect density is necessarily depicted; further, the threshold is depicted at numeral 54 as it appears in relation to the defect signal);

Art Unit: 2621

changing the first standard to a second standard (“threshold line 54 ... may be altered according to the particular needs of the user” at column 7, line 63; it can be seen that the threshold changes from 600 to 500 between figures 4A and 4B; also see “change the threshold value” at column 13, line 32); and

changing the graphical display in response to the change to the second standard (looking at figure 4B, the threshold line at numeral 54 has been lowered to 500) by applying the second standard to said defect candidate image indications by the first standard and stored in the memory (as addressed above, all of the defect indications are stored in the memory; when the standard is changed from a first to a second standard, the display is update accordingly to only show defects meeting the new, second standard; see “change the threshold value to increase or decrease the amount of information being displayed” at column 13, lines 32-33; also see “predetermined threshold” at column 14, lines 26-35).

Regarding claim 35, a selected indication is selected for viewing an inspection image (“mode selected for the particular display” at column 8, line 5; for example, the long, short or angular defects in figure 4a can be selected for prominent display as seen in figures 4b-4d as described at column 8, lines 5-30).

Claims 83 and 84, while reciting pure intended use limitations and not required of the prior art, are nevertheless met by Lam as the entire purposes of changing the thresholds is to ensure that false defect indications are excluded from the analysis, and thus to ensure that the threshold is proper.

Art Unit: 2621

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 39-46, 48, 49, 51-53 and 85-87 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Schemmel et al. (US 6,504,948 B1) and Ishihara et al. (US 3001/0000460 A1).

The Schemmel Reference (essentially repeated from the previous Office Action)

Regarding claims 39, 40 and 41, Schemmel discloses a method comprising:

displaying a two-dimensional defect candidate distribution (“displayed on a display unit 26 as a list or as a graphical representation” at column 12, line 4) for a standard (figure 4, numeral 80; i.e., “TRIP = 9”) on a first screen (“display unit” at column 12, line 4), said two-dimensional distribution comprising an indication of a candidate defect (“flags” at column 7, line 11; graphical representation” at column 12, line 4); and

displaying on a second screen (“second display unit 36” at column 4, line 42) an expanded view of the defect candidate (“high resolution” at column 4, line 38), responsive to a selection on the indication on the first screen (“touching the screen” at column 4, line 23; “computer 32 can direct the silicon wafer handling system 14 to position the defects located on

Art Unit: 2621

the silicon wafer 16 directly in-line with the high resolution microscope 34” at column 4, line 36); and

where the 2D defect candidate distribution displayed on the first screen changes by changing the standard (the defect candidate image indications on the defect distribution screen change responsive to a standard changes; that is, “trip point 80 can be changed manually or automatically” at column 10, line 24, “thereby changing silicon chips 38 incorrectly reported as bad silicon chips 44 to good silicon chips 46” at column 10, line 31).

Regarding claims 40 and 41, the defect image displayed in the second display is an expanded, high resolution image of the candidate defect image (i.e., scanned again by the high resolution optics responsive to a user selection; i.e., “immediate manual inspection” at column 4, line 39; “visual inspection” at column 12, line 14).

Regarding claims 42 and 43, a threshold screen is provided (figure 4, numeral 80) which also depicts defect density (i.e., the histogram depicts the density of the defects which exceed the threshold).

Regarding claim 44, the displayed defects (i.e., the “flags” at column 7, line 11 and graphical representation” at column 12, line 4) are responsive to a user selected threshold (“trip point 80 can be changed manually or automatically” at column 10, line 24).

Regarding claims 45 and 46, defects are displayed by type using different symbols (“displayed as boxes, which may be in colors, representing the different results” at column 12, line 9; two boxes, each a different color indicating a different result, are different symbols; Note: The claim does not specify how they are different).

Art Unit: 2621

Regarding claim 48, symbols are displayed (i.e., the “flags” at column 7, line 11 and graphical representation” at column 12, line 4).

Regarding claim 49, given that the symbols are displayed on a monitor, then the symbols naturally have a gray scale value. Alternately, the histogram at figure 4 graphically displays defects according to gray scale value.

Regarding claims 51 and 52, the result can be enhanced by color (“colors, representing the different results” at column 12, line 9).

Regarding claim 53, black and white displayed results are anticipated by the reference, given that the display using “color” is an alternate embodiment.

Claims 85-87 are entirely intended use or purpose claims that do not positively require anything. For example, claim 83 requires “the graphical display ... is used to judge an effect of said changes to said second standard.” This is recited as an intended use of the graphical display, not an actual use that is required by the claim. Thus, these claims are not given weight as positively recited limitations, and therefore are not required of the prior art.

Differences

Regarding Independent Claim 39, while Schemmel discloses storing defect candidates (“stored in memory” at column 7, line 15) and displaying an expanded view of the candidates (“second display unit 36” at column 4, line 42; “high resolution” at column 4, line 38; “computer 32 can direct the silicon wafer handling system 14 to position the defects located on the silicon wafer 16 directly in-line with the high resolution microscope 34” at column 4, line 36), Schemmel does not disclose:

Art Unit: 2621

storing an actual expanded view of the defect candidate and displaying the expanded view of the defect candidate stored in the memory.

The Ishihara Reference

Ishihara discloses a wafer inspection system comprising storing an expanded view of the defect candidate (figure 9, numeral 907) and displaying the expanded view of the defect candidate stored in the memory (figure 10, numeral 1003; e.g., figure 13, numeral 1306 is a wafer map indicating defect locations, figure 14 represents a selected chip with a defect, and figure 15 represents an expanded view of the defect area).

The Combination

It would have been obvious at the time the invention was made to one of ordinary skill in the art to, instead of storing defect locations and directing a high magnification microscope to those locations as now taught by Schemmel, store expanded view images of the candidate defects for later display as taught by Ishihara, thereby obviating the mechanical and time consuming process of directing an actual microscope to defect areas for additional inspection (i.e., "speedily" at Ishihara paragraph 0009), and to provide the convenience and flexibility of allowing the operator to perform the manual inspection at a later time or even at a different location.

Art Unit: 2621

6. Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Noguchi et al . (US 6,411,377 B1) and Lam (US 5,043,663 A).

Regarding claim 34, Noguchi discloses a method comprising:

displaying a first standard on a display (“m1” at figure 42, step S44; the various displays are depicted in figures 43-45), the first standard used to select defect candidate image indications to be shown on a defect candidate distribution screen on the display (as depicted in figures 43-45); and

changing the first standard to a second standard (figure 42, numeral S50), where the defect candidate image indications on the defect distribution screen change responsive to the second standard (any change to the threshold will change the resultant defect display screens at figures 43-45).

Regarding claim 36, the first standard is calculated (“setting a threshold value” at column 35, line 38; “computed” at line 37) using an electron beam noise value (“noise generated during the detection” at column 35, line 19) for a SEM system (“SEM” at column 55, line 10; the process described in the Noguchi reference is applicable to detection by a SEM, and therefore the setting of a threshold from the detection noise is applicable to noise from the SEM detection).

Regarding both claims, Noguchi does not teach:

using the first standard to select defect candidates to store in a memory,

graphically displaying a relation between the defect density and threshold in which the first standard is indicated, and

Art Unit: 2621

changing the graphical display in response to the second standard by applying the second standard to the defect candidate image indications selected by the first standard and stored in the memory.

This is what Lam teaches as described in the 102 rejection above.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to provide Noguchi with candidate defect storing using the original (first) standard and the graphical display of Lam, in order to allow the user to “selectively filter out false or non-defect indications” (Lam, column 7, line 61) thereby giving the user an intuitive and graphical control over the process of determining the correct threshold to be used for defect detection.

Response to Arguments

7. Each of the remarks and/or arguments filed with the aforementioned amendment have been considered:

Prior Art Rejection: The Schemmel et al. Reference (US 6,504,948 B1):

Summary of Applicant's Remarks: At response page 10, applicant states, “Schemmel et al. does not teach or suggest storing a defect candidate in a memory with an expanded view ...”

Examiner's Response: A new grounds of rejection necessitated by the amendment is applied above. The new reference, “Ishihara”, teaches this element.

Art Unit: 2621

Prior Art Rejection: The Lam Reference (US 5,043,663 A):

Summary of Applicant's Remarks: At response page 11, applicant states, "Lam fails to teach using the first standard to select defect candidate image indications to stored in a memory, and changing the graphical display in response to the change of the second standard by applying the second standard ..."

Examiner's Response: Refer to the revised rejection above. First, Lam discloses the selection of a first standard to store defect candidate image indications in a memory ("threshold number selected by the user ... record the remainder for further processing" at column 5, lines 19-25). Lam also teaches changing the standard to a second standard ("threshold ... may be set or altered according to the particular needs of the customer" at column 7, line 63; "change the threshold value to increase or decrease the amount of information being displayed" at column 13, lines 32-33). Finally, Lam teaches a graphical display that displays whether the current setting for the threshold values are as depicted in figures 4a-4d. When the threshold value is changed (e.g., in figure 4b, the threshold is lowered), the graphical display is updated accordingly.

Prior Art Rejection: Noguchi et al. (US 6,411,377 B1) and Lam (US 5,043,663 A):

This ground of rejection has been re-written above to address the newly added limitations. The arguments are moot in view of the new rejection.

Art Unit: 2621

Suggestion

8. A combination of the elements of claim 34 a presently recited, along with the storage and display of expanded views for each candidate defect as recited in claim 39 may distinguish over the prior art.


Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Werner whose telephone number is 703-306-3037. The examiner can normally be reached on M-F, 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on 703-305-4706. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Brian Werner
Primary Examiner
Art Unit 2621
October 20, 2004



BRIAN WERNER
PRIMARY EXAMINER